CLAIMS

Having thus described our invention in detail, what we claim as new and desire to secure by the Letters Patent is:

1. A method of forming a metallic silicide film comprising the steps of:

first exposing a substrate to a first flux of a Group IVB or VB metal precursor to form a condensed and absorbed monolayer or less of said metal precursor on a surface of the substrate; and

second exposing the condensed and absorbed monolayer or less to a second flux of a silicon source, wherein said first and second exposing is performed at a substrate temperature of less than 450°C.

2. The method of Claim 1 wherein the metal precursor is a halogen-containing Group IVB or VB compound of the formula MX_a wherein M is a Group IVB or VB metal, a is 4 or 5, and X is a halogen.

3. The method of Claim 1 wherein the metal precursor is $TaCl_5$.

4. The method of Claim 1 wherein the silicon source is a silane of the formula Si_nH_{2n+2} wherein n is from 1 to 10.

5. The method of Claim 4 wherein the silane is SiH_4.

6. The method of Claim 1 further comprising introducing a hydrogen plasma to said substrate prior to said second exposing.

7. The method of Claim 1 further comprising introducing a hydrogen plasma to said substrate after said second exposing.

8. The method of Claim 1 wherein after each exposing step a purge gas is introduced to said substrate.

9. The method of Claim 1 wherein said first exposing comprises $TaCl_5$ and said second exposing comprises SiH_4.

10. The method of Claim 1 wherein an evacuation step occurs between the first and second exposing.

11. The method of Claim 1 wherein the metal silicide has a graded composition.

12. A method of forming a VB or VB metal silicon nitride film comprising the steps of:

first exposing a substrate to a first flux of a Group IVB or VB metallic precursor or a silicon source to form condensed and absorbed monolayer or less of said metallic precursor or silicon source on a surface of the substrate;

second exposing the substrate containing the monolayer or less to a second flux of a Group IVB or VB metallic precursor or a silicon source, said second exposing comprises a different material than the first exposing flux, wherein a flux of nitrogen and hydrogen radicals and ions created by a plasma or thermal source is introduced prior to, or after, the second exposing step.

13. The method of Claim 12 wherein the metal precursor of the first or second exposing step is a halogen-containing Group IVB or VB compound of the formula MX_a wherein M is a Group IVB or VB metal, a is 4 or 5, and X is a halogen.

14. The method of Claim 12 wherein the metal precursor is $TiCl_4$ or $TaCl_5$.

15. The method of Claim 12 wherein the silicon source of the first or second exposing step is a silane of the formula Si_nH_{2n+2} wherein n is from 1 to 10.

16. The method of Claim 15 wherein the silane is SiH_4.

17. The method of Claim 12 wherein the first exposing step comprises the metallic precursor and the second exposing step comprises the silicon source.

18. The method of Claim 12 wherein the first exposing step comprises the silicon source and the second exposing step comprises the metal precursor.

19. The method of Claim 12 wherein after each exposing step a purge gas is introduced to said substrate.

20. The method of Claim 12 wherein said first exposing comprises $TaCl_5$ and said second exposing comprises SiH_4.

21. The method of Claim 12 wherein an evacuation step occurs between the first and second exposing steps.

22. The method of Claim 12 wherein the metal silicide has a graded composition.

23. A metal oxide semiconductor device comprising

a substrate; and

a conformal metallic film of the formula MSi_xN_y wherein M is a metal selected from Group IVB (i.e., Ti, Zr or Hf) or VB (i.e., V, Nb or Ta) of the Periodic Table of

Elements; $0<x$; and $0 \leq y$ located on a surface of said substrate, said metallic film having any thickness but preferably about 100 Å or less.

24. The metal oxide semiconductor device of Claim 23 further comprising a conductive material atop the conformal metallic film.

25. The metal oxide semiconductor device of 24 wherein the conductive material is selected from the group consisting of Cu, W, Al, Ta, TaN, TiN, Rh, Ru, Ti, Be, Ag and alloys thereof.

26. The metal oxide semiconductor device of Claim 23 wherein the substrate is a semiconductor substrate, an insulator or a stack thereof.

27. The metal oxide semiconductor device of Claim 23 wherein the conformal metallic film is patterned and is a metal gate of a transistor.

28. The metal oxide semiconductor device of Claim 23 wherein M is Ti or Ta, and y is zero

29. The metal oxide semiconductor device of Claim 23 wherein the conformal metallic film is $TiSi_2$ or $TaSi_2$.

30. The metal oxide semiconductor device of Claim 23 wherein the conformal metallic film is TaSiN or TiSiN.